

## TNC- Half-cell Bifacial Module(48,Black frame)

### Product Feature



High Power Output  
Low LCOE



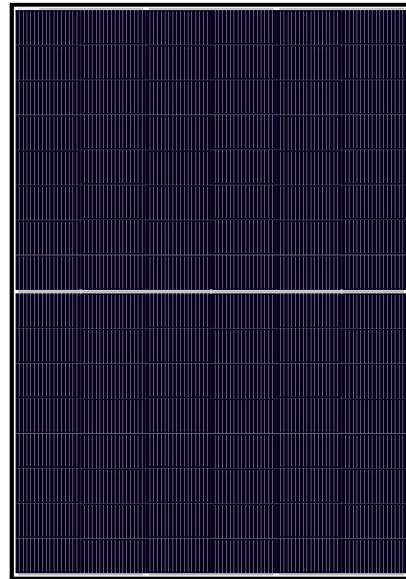
Maximum Power  
up to 450W+



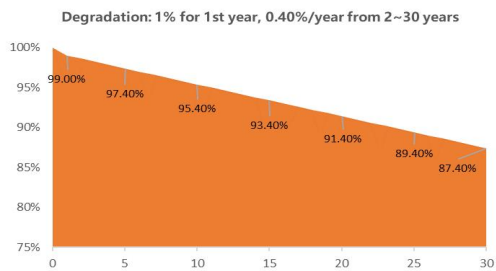
High Reliability



Low Degradation



### Linear Warranty



Warranty for Material and Processing



Warranty for Linear Power output

### Management System certification

- ISO9001: 2015/Quality Management System
- ISO14001: 2015/Environmental Management System
- ISO45001: 2018/Occupational Health and Safety Management System
- IEC62941: 2019/Quality system for PV module manufacturing

### Product certification



Tongwei Solar (Hefei) Co., Ltd  
Made in China

### Electrical Characteristics (STC)

Moduel type: TWMNH-48HD***				
Maximum Power: Pmax [W]	435	440	445	450
Open Circuit Voltage: Voc [V]	34.49	34.67	34.85	35.03
Short Circuit Current: Isc [A]	15.90	15.95	16.00	16.05
Voltage at Maximum Power: Vmp [V]	29.54	29.72	29.90	30.08
Current at Maximum Power: Imp [A]	14.73	14.81	14.89	14.97
Module Efficiency: $\eta$ [%]	21.8	22.0	22.3	22.5
STC: Irradiance 1000W/m <sup>2</sup> , Cell Temperature 25°C, AM=1.5, Test Uncertainty: $\pm$ 3%				

### Electrical Characteristics (NMOT)

Maximum Power: Pmax [W]	327	331	335	338
Open Circuit Voltage: Voc [V]	32.77	32.94	33.11	33.28
Short Circuit Current: Isc [A]	12.84	12.88	12.92	12.96
Voltage at Maximum Power: Vmp [V]	27.51	27.68	27.88	27.96
Current at Maximum Power: Imp [A]	11.89	11.96	12.02	12.09
NMOT: Irradiance 800W/m <sup>2</sup> , Ambient Temperature 20°C, AM=1.5, Wind Speed 1m/s				

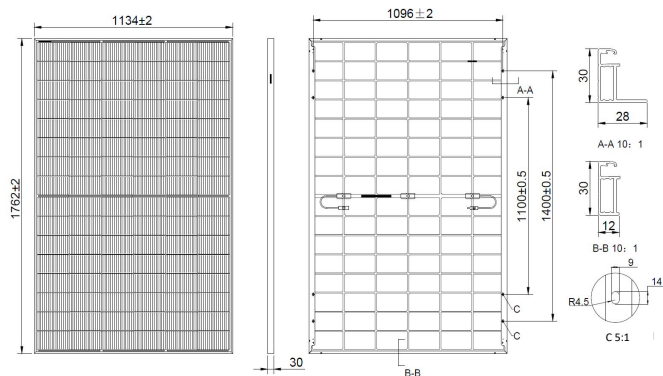
### Electrical characteristics with different rear side power gain

5%	Maximum Power: Pmax[W]	456	462	467	472
	Module Efficiency: $\eta$ [%]	22.8	23.1	23.4	23.6
15%	Maximum Power: Pmax[W]	500	506	512	518
	Module Efficiency: $\eta$ [%]	25.0	25.3	25.6	25.9
25%	Maximum Power: Pmax[W]	544	550	556	563
	Module Efficiency: $\eta$ [%]	27.2	27.5	27.8	28.2

### Mechanical Parameters

Cell Type	TNC
Cell Orientation	96[6×16]
Dimensions	1762±2×1134±2×30mm
Weight	20.9 kg
Front Glass	1.6 mm AR coated heat strengthened glass
Rear Glass	1.6 mm heat strengthened glass
Frame	Anodized aluminum alloy black frame
Junction Box	IP68, 3 diodes
Cable	4.0 mm <sup>2</sup>
Cable length	+1200mm,-1200mm,length can be customized
Wind/Snow load	2400Pa/5400Pa
Per pallet	36 pcs
Packaging	936 pcs per 40'HC,1008 pcs per 13m flatbed trailer,1296 pcs per 17.5m flatbed trailer
Fire class rating	Class C

### Drawing(Unit:mm)

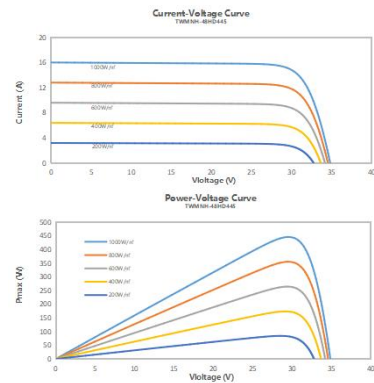


### Temperature rating

Temperature Coefficient of Pmax	-0.30%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of Isc	+0.046%/°C
NMOT	45±2°C

### Operating Parameters

Operating Temperature	-40°C~+85°C
Maximum System Voltage	1500V DC
Maximum Series Fuse Rating	30A
Power Output Tolerance	0~+5W
Bifaciality	80±10%



**Statement:** With technological process and product update, there maybe deviation between the technical parameters of Tongwei's module products and the technical parameters contained in the specification, and Tongwei has the right to adjust the technical parameters at any time without notifying the customer, the final interpretation of the technical specification is vested in Tongwei.

## **Cable type**

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Zhejiang Renhe Photovoltaic Technology Co., Ltd.  
Zhejiang Zhonghuan Sunter PV Technology Co., Ltd.  
Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd  
Ningbo Kibor Wire&Cable Co., Ltd.  
Wuxi Xinhongye Wire&Cable Co., Ltd.  
Trina Solar Co., Ltd.  
Changshu JHOSIN Communication Technology Co., Ltd.  
SUZHOU YONGHAO CABLE CO LTD  
QC Solar (Suzhou) Corporation  
Suzhou Baohing Electric Wire & Cable Manufacturer Co., Ltd.  
Jiangxi Jinko PV Material Co., Ltd.  
Jiangxi Hejia Technology Co., Ltd.  
YushanXinzhan Industrial Co., Ltd.  
DONGGUAN XINBEISEN WIRE AND CABLE CO LTD  
Jiangxi Han Guang Cable Co., Ltd.  
RUIXU INDUSTRY CO., LTD.  
Suzhou Xietong Photovoltaic Technology Co., Ltd.  
Jiangsu Tongling Electric Co., Ltd.  
Zhejiang Chuangyuan Photovoltaic Technology Co.,Ltd.  
Tongwei Solar (Hefei) Co., Ltd.

## **Connector type**

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05-8, Zhejiang Renhe Photovoltaic Technology Co., Ltd.  
PV-KST4-EVO2/xy\_UR , PV-KBT4-EVO2/xy\_UR, Stäubli Electrical Connectors AG  
PV-KST4-EVO2A/xy, PV-KBT4-EVO2A/xy, Stäubli Electrical Connectors AG  
UTXCFabcd, UTXCMabcd,UTXCFabcde, UTXCMabcde, Amphenol Technology (Shenzhen) Co., Ltd.  
RHC2xyzu, Zhejiang Renhe Photovoltaic Technology Co., Ltd.  
PV-JM608, Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd.  
PV-JM601A, Zhejiang Jiaming Tianheyuan Photovoltaics Technology Co., Ltd.  
PV4-S1yx, Tyco Electronics (Shanghai) Co., Ltd.  
HQC4, Hanwha Q CELLS (Qidong) Co., Ltd  
PV-CO02-xy, SUZHOU UKT NEW ENERGY TECHNOLOGY CO., LTD  
TS4-xz , Trina Solar Co., Ltd.  
TS4, Trina Solar Co., Ltd.  
H4Cabdef, Amphenol Technology (Shenzhen) Co., Ltd.  
PV-CF-C-2, 5-4-SETxxxx, PV-CM-C-2, 5-4-SETxxxx, Phoenix Contact GmbH & Co.KG  
PV-ZH202B, Zhejiang Zhonghuan Sunter PV Technology Co., Ltd.  
QC4.10-cds, QC Solar (Suzhou) Corporation  
PV-MH5, Ningbo Minghe New Energy Technology Co., Ltd.  
TL-CABLE01S-F, TL-CABLE01S, Jiangsu Tongling Electric Co., Ltd.  
PV-KST4-EVO 2A/xy\_UR; PV-KBT4-EVO 2A/xy\_UR, Stäubli Electrical Connectors AG



### **Connector type**

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PV-XT101.1, Suzhou Xietong Photovoltaic Technology Co., Ltd.

PV-JK03M-2, PV-JK03M/xy, PV-JK03M1/xy, PV-JK03M2/xy, Jiangxi Jinko PV Material Co., Ltd.

UTXCFabcde, UTXCMabcde, Amphenol Technology (Shenzhen) Co., Ltd.

TW-PVCON-01, Tongwei Solar (Hefei) Co., Ltd.

PV-CY03L, Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd.

PV-CY20L, Zhejiang Chuangyuan Photovoltaic Technology Co., Ltd.